

## CLAIMS

What is claimed is:

1. A method for providing committed access rate (CAR), comprising:
  - classifying each received packet in an IP/Ethernet network into one of a plurality of quality of service (QoS) groups using information in a header of the packet;
  - measuring and checking a traffic rate profile of the received packet against a corresponding service level agreement (SLA),
  - marking the packet as one of an in profile packet and an out of profile packet; and
- 10 performing packet buffer memory reservation to guarantee memory space for in profile CAR packets.
2. The method of claim 1, wherein said classifying of the packet is performed by a control pipe via a content addressable memory (CAM).
- 15 3. The method of claim 2, wherein said CAM comprises a multi-bank ternary CAM (T-CAM) to provide packet classification.
4. The method of claim 1, wherein said measuring and checking is via a token bucket model token.
5. The method of claim 1, wherein said measuring and checking is realized in  
20 hardware.

6. The method of claim 1, wherein a CAR packet is an in profile packet if the  
CAR packet is within the corresponding SLA so that the CAR packet receives  
congestion-free service and wherein a CAR packet is marked as an out of profile packet  
if the CAR packet exceeds the SLA and is one of provided with best effort service and  
5 dropped.

7. The method of claim 1, wherein said measuring and checking facilitates in  
controlling CAR packets, input rate limiting (IRL) packets and output rate limiting  
(ORL) packets.

8. The method of claim 7, wherein IRL and ORL in profile packets receive  
10 best effort service and wherein IRL and ORL out of profile packets are dropped.

9. The method of claim 1, wherein said performing buffer memory reservation  
is via static memory reservation wherein memory space is statically partitioned between  
CAR packets and non-CAR packets.

10. The method of claim 1, wherein said performing buffer memory reservation  
15 is via dynamic memory reservation, wherein packet buffer memory for non-CAR packets  
is dynamically allocated, and wherein a push-out mechanism is employed for non-CAR  
packets.

11. The method of claim 1, wherein a separate multicast queue and a separate multicast threshold are defined for multicast packets, and wherein a multicast counter facilitates in tracking multicast packets.

12. A network device for providing committed access rate (CAR), comprising:

5           a control pipe configured to classify each received packet in an IP/Ethernet network into one of a plurality of quality of service (QoS) groups using information in a header of the packet, the control pipe being further configured to measure and check a traffic transmission rate profile of the received packet against a corresponding service level agreement (SLA), to mark the packet as one of an in profile packet and an out of profile packet, and to perform packet buffer memory reservation to guarantee memory space for in profile CAR packets;

10           a transmit queue in communication with the control pipe; and

15           a packet buffer memory in communication with the transmit queue and configured to receive and store received packets, the control pipe being configured to perform packet buffer memory reservation to guarantee packet buffer memory space for in profile CAR packets.

13. The network device of claim 12, wherein the classification of the packets by the control pipe is performed via a content addressable memory (CAM).

20           14. The network device of claim 13, wherein the CAM comprises a multi-bank ternary CAM (T-CAM) to provide packet classification.

15. The network device of claim 12, wherein control pipe employs a token bucket model to measure and check the traffic transmission rate profile of the received packet, the token bucket model facilitates in controlling CAR packets, input rate limiting (IRL) packets and output rate limiting (ORL) packets.

5        16. The network device of claim 15, wherein the token bucket model is realized in hardware.

17. The network device of claim 15, wherein IRL and ORL in profile packets receive best effort service and wherein IRL and ORL out of profile packets are dropped.

18. The network device of claim 12, wherein a CAR packet is an in profile packet if the CAR packet is within the corresponding SLA so that the CAR packet receives congestion-free service and wherein a CAR packet is marked as an out of profile packet if the CAR packet exceeds the SLA and is one of provided with best effort service and dropped.

19. The network device of claim 12, wherein buffer memory reservation is via static memory reservation in which memory space is statically partitioned between CAR packets and non-CAR packets.

20. The network device of claim 12, wherein buffer memory reservation is via dynamic memory reservation in which packet buffer memory is dynamically allocated for non-CAR packets, and wherein a head-drop mechanism is employed for non-CAR packets.

5           21. The network device of claim 12, wherein a separate multicast queue and a separate multicast threshold are defined for multicast packets, and wherein a multicast counter facilitates in tracking multicast packets.

22. A method for providing committed access rate (CAR) in a communications network, comprising:

10           classifying each received packet into one of a plurality of quality of service (QoS) groups using information in a header of the packet;  
                for a multicast packet, measuring and checking a multicast traffic rate profile of the received multicast packet using a corresponding multicast packet counter,  
                for a CAR packet, measuring and checking a traffic rate profile of the  
15           received CAR packet against a corresponding service level agreement (SLA),  
                marking each CAR and multicast packet as one of an in profile packet and an out of profile packet;  
                for each in profile packet, pushing out queued non-CAR packet if at least one of corresponding packet buffer memory and transmit queue is full; and  
20           queue CAR packet into transmit queue memory.

23. The method of claim 22, further comprising dropping an out of profile multicast packet.
  
24. The method of claim 22, further comprising marking and queuing an out of profile CAR packet as a non-CAR packet.  
5